



APPENDIX B
CLEAN VERSION OF ALL PENDING CLAIMS

1. (Previously amended) An apparatus for passively monitoring physiology of a patient, the apparatus comprising:

at least two sensors, each comprising a piezoelectric film, for sensing physiological signals from the patient and environmental noise from an environment around the patient, wherein at least one sensor is disposed along a patient supporting surface for coupling with the patient so as to sense the physiological signals and at least one sensor comprises an environmental sensor for sensing the environmental noise external to the patient;

a converter communicating with the at least two sensors for converting the physiological signals and environmental noise into digital signals;

a processor communicating with the converter for isolating physiological digital signals from the digital signals by comparing the digital signals between the at least two sensors to provide physiological data; and

a monitor communicating with the processor for displaying the physiological data in real-time.

Claims 2 and 3 previously canceled.

4. (Previously amended) The apparatus of claim 1, wherein the piezoelectric film comprises a polyvinylidene fluoride (PVDF) film.

5. (Previously amended) The apparatus of claim 1, further comprising at least one band-pass filter coupled with the at least two sensors for filtering out the environmental noise.

6. (Previously amended) The apparatus of claim 5, further comprising a pre-amplifier coupled with the band-pass filter for pre-amplifying at least one of the physiological signals.

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7. (Previously amended) The apparatus of claim 1, where the physiological signals and environmental noise are selected from the group consisting of mechanical, thermal and acoustic signals.

8. (Previously amended) The apparatus of claim 1, wherein the physiological signals may be used to indicate any of blood pressure, cardiac output, cardiac function, internal bleeding, respiratory rate, pulse rate, apnea, and body temperature.

9. (As filed) The apparatus of claim 4, further comprising a pad incorporating the PVDF film.

10. (As filed) The apparatus of claim 9, wherein the pad is a fluid-filled interface for facilitating transmittal of physiological signals.

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11. (Amended) The apparatus of claim 10, wherein the fluid comprises a non-reactive substance selected from the group consisting of gel, water, air, foam, rubber, and plastic.

Claims 12-15 previously canceled.

16. (Previously amended) The apparatus of claim 1, wherein the processor further comprises a frequency Fourier transform for transforming the physiological digital signals into frequency data.

17. (Previously amended) The apparatus of claim 16, further comprising a microcomputer for recording, analyzing and displaying the frequency data to enable on-line assessment of the frequency data and real-time response to the frequency data.

18. (Previously amended) The apparatus of claim 1, wherein the piezoelectric film is positioned under the patient at various locations.

Please cancel claim 19 without prejudice or disclaimer.

Claims 20-25 previously canceled.

26. (Previously amended) A passive physiological monitoring apparatus for monitoring physiology of a patient, the apparatus comprising:

plural sensors for sensing data by placing at least one of the plural sensors in a patient supporting surface for coupling with the patient and at least one of the plural sensors in a position for sensing ambient noise without physiological signals, each of the plural sensors comprising a piezoelectric film comprising polyvinylidene fluoride (PVDF), wherein the plural sensors comprise a pair of sensors for sensing the sensed data from the patient and for separately sensing the ambient noise from an environment around the patient;

a converter communicating with each of the plural sensors for converting the sensed data and the sensed ambient noise into signals;

a computing device communicating with the converter for receiving and computing the signals and for outputting computed data; and

instrumentation communicating with the computing device for real-time interaction with the device and for display of the computed data.

Claim 27 previously canceled.

28. (Previously amended) The apparatus of claim 26, wherein at least one of the plural sensors is disposed on a substrate selected from the group consisting of a stretcher, a bed, a litter, an operating table, a gurney, an item of furniture, a cushion, a seat and a seatback.

Claim 29 previously canceled.

30. (Previously amended) The apparatus of claim 26, wherein the plural sensors are configured to measure pulse-wave velocity at plural locations on the patient.

31. (Previously amended) The apparatus of claim 26, wherein the plural sensors are configured to measure pulse-wave travel time at plural locations on the patient.

32. (Previously amended) The apparatus of claim 1, wherein the at least two sensors comprise an array of sensors distributed over different locations along the patient supporting surface for measuring and monitoring the physiological signals from the patient.

33. (Previously amended) The apparatus of claim 32, further comprising a litter incorporating the array of sensors for measuring acoustic and hydraulic signals from the patient, when the patient is positioned on the litter, and from surrounding areas.

Please cancel claim 34 without prejudice or disclaimer.

Claims 35 and 36 previously canceled.

37. (Previously amended) A method for passively monitoring physiology of a patient, the method comprising:

coupling a first piezoelectric sensor with the patient, the first sensor disposed along a patient supporting surface;

placing a second piezoelectric sensor in a location for sensing environmental noise from an environment around the patient;

sensing physiological signals and environmental noise with the first sensor and environmental noise with the second sensor;

converting the physiological signals and environmental noise into physiological and environmental digital signals;

isolating the physiological digital signals from the environmental digital signals by subtracting environmental signals sensed by the second sensor from the signals sensed by the first sensor; and

displaying the physiological digital signals.

Claim 38 previously canceled.

39. (Previously amended) The method of claim 37, further comprising filtering out the environmental noise with a band-pass filter.

40. (Amended) The method of claim 37, wherein sensing the physiological signals and environmental noise comprises sensing mechanical, thermal and acoustic signals.

Claims 41-44 previously canceled.

45. (Previously amended) The method of claim 37, further comprising:
coupling a third sensor with the patient, at a location remote from the first sensor; and
measuring a pulse-wave velocity with the first and third sensors.

Claim 46 previously canceled.

47. (Previously added) An apparatus as in claim 1, wherein the at least two sensors comprise at least three sensors, two sensors disposed along the patient supporting surface so as to couple with the patient at different locations and one sensor positioned for sensing environmental noise from an environment around the patient.

48. (Previously added) An apparatus as in claim 47, wherein the processor compares physiological signals and environmental noise sensed by the two sensors and environmental noise sensed by the one sensor, so as to isolate the physiological signals from the environmental noise.

49. (Previously added) An apparatus as in claim 1, wherein a first sensor is disposed at a first location along the patient supporting surface and a second sensor is disposed at a second location along the patient supporting surface, and wherein the processor determines a pulse-wave velocity in response to a physiological signal time difference between the first sensor and the second sensor.

50. (Previously added) An apparatus as in claim 49, wherein the processor calculates blood pressure data in response to the pulse-wave velocity.

51. (Previously added) A method as in claim 45, further comprising converting the pulse-wave velocity into systolic and diastolic blood pressure data and displaying the blood pressure data.

52. (Previously added) A method as in claim 37, further comprising:
engaging a third sensor with the patient, at a location remote from the first sensor;

comparing physiological signals and environmental noise from the first and third sensors; and

using the comparison to reduce the environmental noise and amplify the physiological signals.

53. (Previously added) A method as in claim 37, further comprising:
engaging a third sensor with the patient, at a location remote from the first sensor; and

measuring a pulse-wave travel time between the first sensor and the third sensor.

54. (Previously added) A method as in claim 53, further comprising converting the pulse-wave travel time into systolic and diastolic blood pressure data and displaying the blood pressure data.

55. (Previously added) A method as in claim 37, wherein the sensing step includes sensing the physiological signals through one or more layers of clothing, bullet proof armor, or a combination thereof.

56. (Previously added) A method for passively monitoring physiology of a patient, the method comprising:

engaging a first piezoelectric sensor with the patient by coupling the patient with a patient supporting surface including the first sensor;

engaging a second piezoelectric sensor in a location for sensing environmental noise but not physiological signals from the patient;

sensing physiological signals and environmental noise with the first sensor and environmental noise with the second sensor;

isolating the physiological signals from the environmental noise by subtracting environmental noise sensed by the second sensor from the signals sensed by the first sensor; and

displaying the physiological digital signals.

57. (Previously added) A method as in claim 56, further comprising:
engaging a third piezoelectric sensor with the patient, at a location remote from the first sensor;

sensing physiological signals and environmental noise with the third sensor; and

comparing the physiological signals and environmental noise from the first sensor with the physiological signals and environmental noise from the third sensor to determine locations of the first and third sensors on the patient.

58. (Added) An apparatus as in claim 1, wherein the at least one sensor disposed along the patient supporting surface for coupling with the patient senses the physiological signals from the patient through at least one layer of clothing.

59. (Added) An apparatus as in claim 1, wherein the at least one sensor comprises a grid of 32 sensors.

60. (Added) An apparatus as in claim 59, wherein each of the 32 sensors is rectangular.

61. (Added) A method as in claim 37, wherein sensing physiological signals comprises sensing signals selected from the group consisting of blood pressure, heart rate, respiratory rate, pulse pressure and body temperature.

62. (Added) A method as in claim 56, wherein engaging the first piezoelectric sensor with the patient and sensing physiological signals from the patient occur through at least one layer of clothing.

63. (Added) A method as in claim 56, wherein sensing physiological signals comprises sensing signals selected from the group consisting of blood pressure, heart rate, respiratory rate, pulse pressure and body temperature.

64. (Added) An apparatus for passively monitoring physiology of a patient, the apparatus comprising:

a patient supporting surface; and

a plurality of piezoelectric sensors disposed along the supporting surface for sensing physiological signals from the patient and environmental noise from an environment around the patient;

a converter coupled with the sensors for converting the physiological signals and environmental noise into digital signals; and

a processor coupled with the converter for isolating physiological digital signals from the digital signals by comparing the digital signals between the sensors to provide physiological data.

65. (Added) An apparatus as in claim 64, further comprising a monitor coupled with the processor for displaying the physiological data.

66. (Added) An apparatus as in claim 64, wherein the physiological signals comprise heart beat motion and respiratory motion.

67. (Added) An apparatus as in claim 64, wherein the physiological data are selected from the group comprising heart rate, blood pressure, respiratory rate, pulse pressure, body temperature and cardiac function.

68. (Added) An apparatus as in claim 64, wherein the plurality of sensors comprises a grid of 32 sensors.

69. (Added) A method for passively monitoring physiology of a patient, the method comprising:

providing a plurality of piezoelectric sensors disposed along a patient supporting surface;

sensing, with the sensors, physiological signals from the patient and environmental noise from an environment around the patient;

converting the physiological signals and the environmental noise into physiological and environmental digital signals;

isolating the physiological digital signals from the environmental digital signals; and

displaying the physiological digital signals as physiological data.

70. (Added) A method as in claim 69, wherein the physiological signals comprise heart beat motion and respiratory motion.

71. (Added) A method as in claim 69, wherein the physiological data are selected from the group comprising heart rate, blood pressure, respiratory rate, pulse pressure, body temperature and cardiac function.

72. (Added) An apparatus as in claim 69, wherein the plurality of sensors comprises a grid of 32 sensors.